REMARKS

Claims 5-37 remain in the application. Reconsideration of the application in view of the amendments and the remarks to follow is requested.

Claims 5, 7, 9, 12, 13, 15, 18, 21 and 24-37 stand rejected under 35 U.S.C. §102(b) as being anticipated by Tsu et al. (5,635,741). Claims 5, 6, 8, 10-12, 14, 16-20, 22 and 23 stand rejected under 35 U.S.C. §102(e) as being anticipated by Ueda et al. (6,285,051 B1). Claim 32 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Arita et al. (6,236,076 B1) in view of Ueda et al.

The Examiner objects to the drawings, specifically referring to claims 33-37 stating that the drawings do not show a capacitor is formed over a substrate and devoid of intermediate layers between one of the first and second conductive electrodes and the substrate. Respectfully, the Examiner is mistaken. As clearly shown in Fig. 2 and specifically described at pages 6-7 of the originally-filed application:

> Fig. 2 depicts a wafer fragment 30 comprising a capacitor 32 having first and second electrodes 24 and 26....A high k capacitor dielectric region 35 is positioned between first capacitor electrode 24 and second capacitor electrode 26....Most preferably and as shown, capacitor dielectric region 35 consists essentially of such layer, **meaning no other layers are received intermediate first electrode 24 and second electrode 26** which meaningfully impact the operation or capacitance of capacitor 32.... By way of example only, capacitor 32 depicts capacitor dielectric region and layer 35 as comprising an inner region 36, a middle region 38, and an outer region 40.

(emphasis added). That is, the exemplary capacitor 32 of Fig. 2 is formed over a substrate 12 and devoid of intermediate layers between one of the first and second conductive electrodes 24, 26 and the substrate 12 as positively recited in claims 33-37, and such is shown in the example of Fig. 2. Accordingly, the objection to the drawings is improper and should be withdrawn in the next office action.

Independent claim 5 stands rejected as being anticipated by Tsu. The Examiner is respectfully reminded that the PTO and Federal Circuit provide that §102 anticipation requires that *each and every element* of the claimed invention be disclosed in a single prior art reference. *In re Spada*, 911 F.2d 705, 15 USPQ2d 1655 (Fed. Cir. 1990); MPEP §2131 (8th ed.). The corollary of this rule is that the absence from a cited §102 reference of *any* claimed element negates the anticipation. *Kloster Speedsteel AB, et al. v. Crucible Inc.*, 793 F.2d 1565, 230 USPQ 81 (Fed. Cir. 1986).

Claim 5 recites a high k capacitor dielectric region comprising a layer of metal oxide having multiple different metals bonded with oxygen, one of the metals when bonded with oxygen having a first current leakage potential, **another of the metals** when bonded with oxygen having a second current leakage potential which is greater than the first current leakage potential. That is, claim 5 recites to **another of the metals**, a second metal, that has a recited

relationship of a current leakage potential, a second current leakage potential when bonded with oxygen.

However, in contrast, Tsu teaches modifying a current leakage of a BST dielectric film 24 with the use of **only one metal**, erbium, by doping the BST film 24 with erbium:

> These particular results show a decrease in dielectric constant over undoped BST for all levels of erbium doping. However, leakage current also decreases compared to undoped BST for up to three percent erbium doping (with more than an order of magnitude decrease for two percent erbium). Although not well understood, erbium concentrations added in a narrow range (e.g. 0.3 to 3 mol %) apparently reduce dielectric leakage for a small-grained thin film.

(Col. 5, lines 40-48). That is, Tsu teaches varying only one metal, erbium, to modify the leakage current of a BST film. Accordingly, it is inconceivable that Tsu teaches or suggests **another of the metals** when bonded with oxygen having a second current leakage which is greater than the first current leakage potential as positively recited by claim 5. Since Tsu does not teach each and every element of claim 5, pursuant to the above authority, claim 5 is allowable over Tsu.

Moreover, claim 5 recites a high k capacitor dielectric region comprising a layer of metal oxide having multiple different **metals bonded with oxygen**, one of the metals **when bonded with oxygen** having a first current leakage potential, another of the metals **when bonded with oxygen** having a second current leakage potential which is greater than the first current leakage potential. That

is, claim 5 recites to a metal oxide wherein the different metals are **bonded with oxygen** which provide the current leakage relationships. However, Tsu teaches to dope a BST film with erbium to vary current leakage relationships and provides no teaching or insight as to how the erbium will be positioned in the BST film. Accordingly, it can not be stated that the erbium is bonded with oxygen. One skilled in the art understands that dopant atoms move through a wafer by different mechanisms. *Micronchip Fabrication*, by Van Zant, 3rd Edition, published by McGraw-Hill, ©1997, pages 319-320 (courtesy copy of pgs. 319-320 provided). Such reference states that dopant atoms can move by filling empty crystal positions, vacancies, and can move by interstitial movement of the dopant wherein the dopant moves through the spaces between the crystal sites, that is, intersite. Consequently, without further teachings of Tsu, the cursory doping the BST film with erbium provides no teaching or suggestion of the erbium configuration within the BST film. Therefore, it is inconceivable that Tsu teaches or suggests one of the metals **when bonded with oxygen** having a first current leakage potential as positively recited in claim 5. Additionally, it is inconceivable that Tsu teaches or suggests another of the metals **when bonded with oxygen** having a second current leakage potential as positively recited in claim 5. For these additional reasons, Tsu does not teach each and every element of claim 5, and therefore, pursuant to the above authority, claim 5 is allowable over Tsu.

Independent claim 5 also stands rejected as being anticipated by Ueda. Ueda teaches a dielectric film 1 having a high dielectric constant layer 3 and a low leakage current layer 5 (col. 5, lns. 17-23). Ueda further teaches the high dielectric constant layer 3 is a BST film having a specific stoichiometry, while the low leakage current layer 5 has the same elements of the BST film with varying amounts of titanium, that is, a different stoichiometry, and varying the concentration (mole fraction) of the titanium modifies a current leakage relationship of the dielectric film 1 (col. 5, lns. 17-32; col. 7, lines 27-49; Abstract). That is, Ueda teaches varying the concentration (mole fraction) of **only one metal** within a Ba, Sr and Ti combination, and that one metal is titanium (col. 7, lines 27-49; Abstract). Since Ueda teaches varying only one metal, titanium, to modify the leakage current of a BST film, it is inconceivable that Ueda teaches or suggests **another of the metals** when bonded with oxygen having a second current leakage which is greater than the first current leakage potential as positively recited by claim 5. Since Ueda does not teach each and every element of claim 5, pursuant to the above authority, claim 5 is allowable over Ueda. No other rejections are presented against claim 5, and therefore, claim 5 is allowable.

If claim 5 is not allowed, Applicant respectfully requests identification of the one and the another metals in a non-final office action which discloses the alleged teachings suggested by the Examiner, or the submission of an affidavit

to support the Examiner's rejection, pursuant to MPEP §2144.03 (8th ed.) and 37 C.F.R. §1.104(d)(2). "Assertions of technical facts in areas of esoteric technology must always be supported by citation of some reference" and "allegations concerning specific 'knowledge' of the prior art, which might be particular to a particular art should also be supported." *In re Ahlert*, 424 F.2d 1088, 165 USPQ 418, 420-421 (CCPA 1970) (emphasis added). 37 C.F.R. §1.104(d)(2) states "when a rejection in an application is based on facts within the personal knowledge of an employee of the office, the rejection must be supported by an affidavit when called for by the applicant." The Examiner is not pointing to any teaching of the above stated limitations. Accordingly, the rejection can only be based upon the personal knowledge of the Examiner. Without supporting prior art, affidavit or other evidence that Applicant can rebut, Applicant is denied an opportunity during prosecution to properly respond to the obviousness rejection due to the lack of prior art. According to 37 CFR §1.104(d)(2), Applicant should have the opportunity to contradict or explain such prior art. Identification of additional prior art or specific teachings within the existing art, or an affidavit, is requested and appropriate.

Claims 6-11 and 33 depend from independent claim 5, and therefore, are allowable for the reasons discussed above with respect to the independent claim, as well as for their own recited features which are not shown or taught by the art of record.

Independent 12 stands rejected as being anticipated by Tsu. Claim 12 recites a high k capacitor dielectric region comprising a layer of metal oxide having multiple different metals bonded with oxygen, one of the metals when bonded with oxygen producing a first material having a first current leakage potential, **absence of the one metal in the oxide** creating a vacancy and a second material having a second current leakage potential which is greater than the first current leakage potential. However, in contrast, Tsu teaches modifying a current leakage relationship of a BST dielectric film 24 with the use of **only one metal**, erbium, by doping such film with erbium (col. 5, lines 40-48). That is, Tsu teaches **adding a metal** to modify the leakage current of a BST film. Accordingly, there is no relationship taught or suggested by Tsu of the absence to erbium from the BST film **creating a vacancy**. Consequently, it is inconceivable that Tsu teaches or suggests absence of the one metal in the oxide **creating a vacancy** as positively recited by claim 12. Since Tsu does not teach each and every element of claim 12, pursuant to the above authority, claim 12 is allowable over Tsu.

Independent claim 12 also stands rejected as being anticipated by Ueda. Ueda teaches varying the concentration (mole fraction) of **only one metal** within a Ba, Sr and Ti combination, and that one metal is titanium (col. 7, lines 27-49; Abstract). However, Ueda does not teach or suggest totally removing the titanium to have **an absence of titanium** in the BST film, nor does Ueda teach

to **create a vacancy**. Accordingly, it is inconceivable that Tsu teaches or suggests absence of the one metal in the oxide **creating a vacancy** as positively recited by claim 12. Since Ueda does not teach each and every element of claim 12, pursuant to the above authority, claim 12 is allowable over Ueda. No other rejections are presented against claim 12, and therefore, claim 12 is allowable.

Claims 13-17 and 34 depend from independent claim 12, and therefore, are allowable for the reasons discussed above with respect to the independent claim, as well as for their own recited features which are not shown or taught by the art of record.

Independent 18 stands rejected as being anticipated by Tsu. Claim 18 recites a high k capacitor dielectric region comprising a layer of metal oxide having multiple different metals bonded with oxygen, one of the metals when bonded with oxygen having a first dielectric constant, **another of the metals** when bonded with oxygen having a second dielectric constant which is less than the first dielectric constant. That is, claim 18 recites to **another of the metals**, a second metal, that has the recited relationship of a dielectric constant, a second dielectric constant. However, Tsu teaches adding erbium to the BST dielectric film to modify the dielectric constant of the BST film (col. 5, lns. 40-48). It is inconceivable that Tsu teaches or suggests **another of the metals** when bonded with oxygen having a second dielectric constant which is less than

the first dielectric constant as positively recited by claim 18. Since Tsu does not teach each and every element of claim 18, pursuant to the above authority, claim 18 is allowable over Tsu.

Moreover, claim 18 recites one of the metals when bonded with oxygen having a first dielectric constant, **another of the metals** when bonded with oxygen having a second dielectric constant which is less than the first dielectric constant. That is, claim 18 recites to a metal oxide wherein the different metals **are bonded with oxygen** which provide the dielectric constant relationships. However, the Tsu teaching to dope a BST film with erbium provides no teaching or insight as to how the erbium will be positioned in the BST film, and therefore, it can not be stated that the erbium is bonded with oxygen. One skilled in the art understands that dopant atoms move through a wafer by different mechanisms as stated previously referring to *Microchip Fabrication* by Van Zant. Without further teachings of Tsu, doping the BST film with erbium provides no teaching or suggestion of the erbium configuration within the BST film. Consequently, it is inconceivable that Tsu teaches or suggests one of the **metals when bonded with oxygen** having a first dielectric constant as positively recited in claim 18. Additionally, it is inconceivable that Tsu teaches or suggests **another of the metals** when bonded with oxygen having a second dielectric constant which is less than the first dielectric constant as positively recited in claim 18. For these additional reasons, Tsu does not teach each and every

element of claim 18, and therefore, pursuant to the above authority, claim 18 is allowable over Tsu

Independent claim 18 also stands rejected as being anticipated by Ueda. Ueda teaches varying the concentration (mole fraction) of **only one metal** within a Ba, Sr and Ti combination, and that one metal is titanium (col. 7, lines 27-49; Abstract). Accordingly, it is inconceivable that Ueda teaches or suggests **another of the metals** when bonded with oxygen having a second current leakage which is greater than the first current leakage potential as positively recited by claim 18. Since Ueda does not teach each and every element of claim 18, pursuant to the above authority, claim 18 is allowable over Ueda. No other rejections are presented against claim 18, and therefore, claim 18 is allowable.

Claims 19-24 and 35 depend from independent claim 18, and therefore, are allowable for the reasons discussed above with respect to the independent claim, as well as for their own recited features which are not shown or taught by the art of record.

Independent 25 stands rejected as being anticipated by Tsu. Claim 25 recites a high k capacitor dielectric region comprising a layer of metal oxide having multiple different metals bonded with oxygen, one of the metals when bonded with oxygen producing a first material having a first dielectric constant, absence of the one metal in the oxide **creating a vacancy** and a second material having a second dielectric constant which is less than the first dielectric

constant. However, Tsu teaches **adding a metal** to modify the dielectric constant of a BST film (col. 5, lines 40-48). Tsu does not teach or suggest the absence of the one metal in the oxide **creating a vacancy**. Moreover, Tsu fails to teach or suggest a vacancy of a metal having a dielectric constant relationship. Accordingly, it is inconceivable that Tsu teaches or suggests absence of the one metal in the oxide **creating a vacancy** and a second material having a second dielectric constant as positively recited by claim 25. Since Tsu does not teach each and every element of claim 25, pursuant to the above authority, claim 25 is allowable over Tsu. No other rejections are presented against claim 25, and therefore, claim 25 is allowable.

Claims 26-31 and 36 depend from independent claim 25, and therefore, are allowable for the reasons discussed above with respect to the independent claim, as well as for their own recited features which are not shown or taught by the art of record.

Claim 32 stands rejected as being obvious over the combination of Arita and Ueda. Claim 32 recites a capacitor comprising first and second conductive electrodes. That is, the electrodes are in the same device. The Examiner relies on Figs. 9 and 19 of Arita referring to references numbers 30 and 816 to allegedly teach the first and second conductive electrodes (pg. 11 of paper no. 40). However, references numbers 30 and 816 of Figs. 9 and 19, respectively, are two different embodiments of two different devices, and neither embodiment

of Arita teach a single device having a first and second electrode. In fact, Fig. 9 is directed to a transistor, not a capacitor as recited in claim 32. One skilled in the art would not be motivated to look to teachings of a transistor for relevant teaching to a capacitor, nor attempt to combine disparate teachings of two different devices. Accordingly, the rejection is improper and should be withdrawn.

Moreover, the Examiner is respectfully reminded, for a proper obviousness rejection, the prior art reference (or references when combined) must teach or suggest all the claim limitations. See, e.g., MPEP §2143 (8th edition). The Examiner relies on element 816 of Fig. 19 of Arita to teach an electrode (pg. 11 of paper no. 40), but element 816 is a titanium oxide adhesion layer and not an electrode (col. 20, lns. 28-31). Accordingly, the combination of art for rejecting claim 32 does not teach all the claim limitations. For this additional reason, the rejection is improper and should be withdrawn.

Furthermore, claim 32 recites electrodes comprise material of at least one of conductively doped polysilicon, conductively doped hemispherical grain polysilicon, tungsten, tungsten nitride, tantalum nitride, titanium nitride and titanium oxygen nitride. The Examiner correctly states Arita does not teach this limitation and relies on Ueda to teach the limitation referring to a teaching of titanium nitride (pg. 11 of paper no. 40). The Examiner provides a bald and cursory motivational rationale for modifying the Arita invention to include the titanium nitride which is stated as: for creating a buffer region to better isolate

device regions (pg. 11 of paper no. 40). However, Ueda fails to teach this rationale, and noticeably, the Examiner does not point to any teachings of the references of such a statement. There is no evidence of record that the Arita disclosure is defective or concerned with respect to insufficient isolation, and accordingly, the alleged motivational rationale only results from the Examiner. Without a proper motivational rationale from the record, the obviousness rejection on which it is based must fail. For this additional reason, claim 32 is allowable.

Claim 37 depends from independent claim 32, and therefore, is allowable for the reasons discussed above with respect to the independent claim, as well as for their own recited features which are not shown or taught by the art of record.

This application is now believed to be in immediate condition for allowance, and action to that end is respectfully requested. If the Examiner's next anticipated action is to be anything other than a Notice of Allowance, the undersigned respectfully requests a telephone interview prior to issuance of any such subsequent action.

Respectfully submitted,

Dated: 3-16-04 By: _____

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